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10/757,463	01/15/2004	Wei-Hong Wang	2019-0237P	5053

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EXAMINER
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ORLANDO, MICHAEL N

ART UNIT	PAPER NUMBER
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1791

NOTIFICATION DATE	DELIVERY MODE
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11/19/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/757,463	<b>Applicant(s)</b> WANG, WEI-HONG	
	<b>Examiner</b> MICHAEL N. ORLANDO	<b>Art Unit</b> 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 August 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                      |                                                                   |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____                                                          | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

The arguments and amendments submitted August 28, 2008 have been fully considered and the 112 rejection is hereby withdrawn. A new 112 issue has arisen though. Also, the merits of the claims remain unpatentable over the prior art as set forth below.

#### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification sets forth that drying is done at room temperature followed by baking at 100-250.degrees.C.. If the applicant is referencing the only drying step set forth in the specification than such is new matter. If the applicant is referring to the baking step set forth in specification further clarification is needed. The claims will be addressed according to the baking step set forth in the specification since the baking step is the only one which reasonably coincides with the claimed temperature ranges.

Art Unit: 1791

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1 and 7, it is unclear if the application is talking about the pre-drying step or the baking step as set forth in the specification because as set forth in the specification the drying is first done at room temperature then the coating is baked at temperatures from 100-250.degrees.C. The examiner will take the position given the range set forth that the drying step referred by step (2) of claims 1 and 7 is the baking step.

Claim 7 recites the limitation "said impregnated photocatalyst-coated glass fiber cloth" in "steps 3 and 4 of the process". There is insufficient antecedent basis for this limitation in the claim. There is no previous mention of an impregnation step it is unclear what the applicant is referencing because there is merely a previous a dip coating and a drying step. The examiner takes the position therefore that the steps 3 and 4 are more accurately referring to the drying of the coated glass fiber.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

Art Unit: 1791

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Wang (US 6,135,838) in view of the "Titanium dioxide photocatalysis" article, Taoda et al. (US 5,670,206) and Yamada et al. (US 5,897,958).

Wang discloses a method of making a lamp for air cleaning comprising: formulating a photocatalyst coating sol such as of anatase TiO<sub>2</sub> and dip coating a glass fiber cloth or sleeve with the sol; drying the coated cloth or sleeve to form a cloth or sleeve coated with anatase TiO<sub>2</sub> crystals; impregnating the cloth or sleeve with a solution of an oxidation catalyst comprising precious metals or transition metal oxides; drying again; wrapping the cloth around a lamp tube or slipping the sleeve on a lamp tube; and fixing the cloth or sleeve to the lamp by UV resistant glue or laser sintering (col. 3-9). Wang discloses that providing the sol on a glass fiber cloth or sleeve provides an increased surface area of photocatalysts and can allow waste gases in the air to diffuse readily in the photocatalytic active sites. Wang discloses providing the glass fiber cloth or sleeve on a UV lamp tube but does not disclose providing the cloth or sleeve on a fluorescent lamp tube. Wang discloses drying, baking and sintering the photocatalyst

Art Unit: 1791

sol coated cloth or sleeve to produce a photocatalyst-coated glass fiber cloth or sleeve but does not specifically disclose that sol comprises nano crystalline anatase particles and that the photocatalyst after baking and sintering is nano-crystalline. Wang further discloses that the baking step is done in the range of 100-200.degrees.C. (column 3, lines 62-65).

"Titanium dioxide photocatalysis" article teaches that odors objectionable to humans are due to compounds present only on the order of 10 parts per million by volume and at these concentrations, the UV light available from ordinary fluorescent lighting should be sufficient to decompose such compounds when TiO<sub>2</sub> photocatalysts are present (pg. 5).

Taoda et al. teach that a deodorizing lamp for decomposing malodorous substances can be made by providing TiO<sub>2</sub>, such as from a sol solution, on the surface of lamps including incandescent lamp, fluorescent lamp, black-light lamp, UV lamp, mercury-vapor lamp, xenon flash lamp, halogen lamp and metal halide lamp, either of cylindrical, bulbous or some complicated shape. For enhancing the effectiveness of the deodorizing lamp, the lamp unit is desired to produce light with a large shortwave light component. The TiO<sub>2</sub> absorbs harmful UV light emitted from the light source and the light emitted from the lamp is easy on the eyes and safe for the human body and can therefore be used as a room lamp (col. 2, line 1-23, col. 4, lines 6-15).

Yamada et al. teach that in making photocatalyst from a titanium oxide sol, the sol contains crystalline particles of anatase type and having average particle size of from 1 to 300 nm dispersed in the sol because smaller than 1 nm and the wavelength

Art Unit: 1791

range of light having interaction tends to be narrow while if larger than 300 nm, it tends to be difficult to obtain high activities. Yamada et al. teach drying and baking a sol having particles of average particle size of 20 to 30 nm to form a film having titanium oxide particles of average particle size of 30-40 nm (col. 4, line 64 - col. 5, line 6, col. 10, lines 10-40). Yamada et al. also teach that aqueous TiO<sub>2</sub> sol is stable only in pH range of not higher than 3 or not lower than 10 and teach using either acid or alkali to form the aqueous sol (col. 3, lines 8-12). Yamada also recognizes that anatase (i.e. the crystalline form) is generally considered to have higher affects than the amorphous form (i.e. rutile) (column 2, lines 51-56). Also, Yamada discloses that catalytic activities are affected by the particle size as well (column 3, lines 1-2).

It would have been obvious to one of ordinary skill in the art to have modified the method of Wang by using the process to form photocatalyst on a fluorescent lamp tube instead of a UV lamp tube in order to provide a lamp which can be used as a deodorizing lamp for decomposing malodorous substances and also as a lamp that can be used as a room lamp, as taught by Taoda et al. Fixing the cloth or sleeve on a fluorescent lamp tube would have been obvious to one of ordinary skill in the art because the "Titanium dioxide photocatalysis" article teaches that even fluorescent lighting provides sufficient UV light to decompose odors and Taoda et al. teach that lamps for decomposing odors and which can be provided with TiO<sub>2</sub> from a sol solution include not only UV lamps but also incandescent lamps, fluorescent lamps, black-light lamps, mercury-vapor lamps, xenon flash lamps, halogen lamps and metal halide lamps. The use of the sol as coated on a glass fiber cloth instead of directly on the

Art Unit: 1791

lamps such as a fluorescent lamp would have been obvious to one of ordinary skill in the art for the benefit of increased surface area of photocatalysts which allows gases in the air to diffuse readily in the photocatalytic active sites, as disclosed by Wang.

It would have been obvious to one of ordinary skill in the art to have further modified the method of Wang by providing the sol of nano crystalline anatase particles of size in the range of 1 to 300 nm (nano crystalline), as taught by Yamada et al. as useful particle size for particles in a sol for making photocatalyst because smaller than 1 nm and the wavelength range of light having interaction tends to be narrow while if larger than 300 nm, it tends to be difficult to obtain high activities. Baking and sintering the photocatalyst sol to form a photocatalyst coating that is nano crystalline would have been obvious to one of ordinary skill in the art because Yamada et al teach that the nano crystalline particles in the sol are dried and baked to for a photocatalyst film having particles of average particle size of 30-40 nm. Because Yamada et al. teach that when particle size is smaller than 1 nm, wavelength range of light having interaction tending to be narrow, while it tends to be difficult to obtain high activities if the size is larger than 300 nm, it would have been obvious to one of ordinary skill in the art to have dried, baked and sintered the sol to form a coating having nano crystalline particles of such size so as to have sufficiently high photocatalyst activity at sufficiently large wavelength range for interaction. Since Wang appreciates the need for titanium dioxide as a photocatalyst other art pertaining to the use of titanium dioxide as a photocatalyst would be relevant teachings. Yamada provides further insight and first off specifically denotes that the crystalline form, anatase, is generally accepted as being more active



Art Unit: 1791

than the amorphous form, rutile. Yamada also denotes that particle size for such titanium dioxide particles useful as photocatalysts has a direct effect on the catalytic activity (column 3, lines 1-2). Still further Yamada indicates that titanium oxide in the nano form (i.e. 1-100nm) is the preferred titanium oxide particle size that is ideal in both the amount of light allowed through and the activity (column 4, line 64 through column 5, line 6). There would have been ample motivation for an ordinary skilled artisan presented with the invention of Wang to look to the teachings of Yamada to achieve maximal catalytic activity.

Regarding Claim 1, the use of a thermal plastic ring belt or sewing would have been obvious to one of ordinary skill in the art as alternatives to UV resistant glue or laser sintering for fixing the cloth or sleeve to the lamp.

Regarding Claim 2, Wang discloses that the sol can contain organic and/or inorganic salts of other metals such as W, Zn, Sn and Fe and the sol is made of  $Ti(OR)_4$  with alcohol solvent and amount of water.

Regarding Claim 3, Wang discloses that acids HCL and  $HNO_3$  can be added to the  $TiO_2$  sol to adjust the pH thereof to 1-3, thus using an acidic process to prepare the sol.

Regarding Claim 4, it would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined by preparing the  $TiO_2$  sol in an alkaline process using an alkali, as taught by Yamada et al., as an alternative to using an acid. Using either an acid in an acid process to adjust the sol to pH of 1-3 or using an alkali to adjust the pH of the sol to greater than 10 would have been obvious to

Art Unit: 1791

one of ordinary skill in the art as alternatives, as Yamada et al. teach that the sol is stable only at either pH less than 3 or greater than 10 which can be done by using either an acid or alkali.

Regarding Claim 5, Wang discloses that the substrates such as glass fiber cloth are transparent.

Regarding Claim 6, Wang discloses that the sol coating on the cloth results in chemical bonding such that the coating does not peel easily from the cloth (col. 12, lines 42-47).

Regarding Claim 7, as to the particles being nanoparticles for the oxidation catalysts. Wang discloses the use of oxidative catalysts of nano-sized precious metals in the elemental state of nano-sized transition metal-oxides (column 4, lines 1-9; column 7, lines 5-10). The nano-size of the oxidation catalysts is evidenced by the fact that Wang discloses that the oxidation catalysts are absorbed into the mesopores of the fiber (column 7, lines 25-30). A mesopore is defined as a small pore with a diameter between 2 and 50nm. Since the pores are nano-sized and the catalysts need to be absorbed into such pores they must either be at least smaller than 50nm and therefore Wang clearly appreciates that such small particles as an nano-sized particles are suitable for use because they must be sufficiently small to be absorbed into the mesopores. The combination of the oxidation catalysts and photocatalyst into one step is a matter of obviousness that produces the expected result of decreasing the manufacturing time. The courts have held that simultaneous steps are obvious over successive steps in similar processes (New Wrinkle v. Marzall 93 USPQ 92, New

Art Unit: 1791

Wrinkle v. Watson 96 USPQ 436). The combination would have been accomplished with predictable success because as set forth by Wang the oxidative catalysts, while able to be absorbed into the micropores of the previously applied photocatalyst coating, can also be absorbed into the mesopores of the fiber and therefore a substantial amount of the oxidation catalyst would be expected to be still be absorbed onto the fiber directly through the mesopores even without the absorption into the aforementioned micropores (column 7, lines 21-30). The motivation to combine the coating steps into one rather than two separate steps would have been to produce the product with better efficiency (i.e. less time to manufacture).

Regarding Claim 8, Wang discloses that the oxidation catalyst can be Pd, Pt, Au or Ag precious metal salt solution such that the amount of oxidation catalyst in the photocatalyst is 0-10 wt%.

Regarding Claim 9, Wang discloses that the sol can contain organic and/or inorganic salts of other metals such as W, Zn, Sn and Fe in amount of 1-100% of the TiO<sub>2</sub> and the oxidation catalyst can be Mo, Nb, V, Ce or Cr transition metal salt solution such that the amount of oxidation catalyst in the photocatalyst is 0-10 wt%.

Regarding Claim 10, Wang discloses wrapping the cloth around a lamp tube or slipping the sleeve on a lamp tube.

Regarding Claims 11 and 12, it would have been obvious to one of ordinary skill in the art to have used a fluorescent lamp which emits visible light as well as a small amount of 365nm UV light and 405nm near UV light in order to provide UV light sufficient to decompose odors, as taught by the "Titanium dioxide photocatalysis" article

Art Unit: 1791

and well as provide light that is easy on the eyes and safe for the human body and can therefore be used as a room lamp, as taught by Taoda et al.

4. Claim 11 is alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over the references applied to claim 1 above and further in view of Ichikawa et al. (US 6,024,929).

Wang disclose including iron oxide photocatalyst with the TiO<sub>2</sub> photocatalyst.

Ichikawa et al. teach that fluorescent lamps emit light in the wavelength range of 290 nm - 750nm and for deodorizing, TiO<sub>2</sub> absorbs the UV light of wavelength 365 nm while iron oxide photocatalyst absorbs visible light of 405 nm and 436 nm wavelengths and is excited by the absorbed light (col. 7, lines 66-67, col. 8, lines 42-55, col. 11, lines 4-9).

By providing the photocatalyst-coated glass fiber cloth or sleeve on a fluorescent lamp, a lamp that emits visible light in the range of 420-700nm wavelength is obviously provided, as Ichikawa et al. teach that fluorescent lamps emit light in the wavelength range 290 nm - 750nm. Allowing the lamp to emit a small amount of light of wavelengths of 365 nm and 405 nm would have been obvious to one of ordinary skill in the art to provide UV light for absorption by the TiO<sub>2</sub> photocatalyst and light for absorption by the iron oxide photocatalyst for deodorizing, as taught by Ichikawa et al.

### ***Response to Arguments***

Applicant's arguments filed 08/28/2008 have been fully considered but they are not persuasive.

Art Unit: 1791

The applicant contends that the anatase nano-crystalline particles would not have been an obvious choice in view of the cited prior art.

The examiner disagrees and notes that Wang appreciates the need for the titanium dioxide sol to act as a photocatalyst. Since Wang appreciates the need for titanium dioxide as a photocatalyst other art pertaining to the use of titanium dioxide as a photocatalyst would be relevant teachings. Yamada provides further insight and first off specifically denotes that the crystalline form, anatase, is generally accepted as being more active than the amorphous form, rutile. Yamada also denotes that particle size for such titanium dioxide particles useful as photocatalysts has a direct effect on the catalytic activity (column 3, lines 1-2). Still further Yamada indicates that titanium oxide in the nano form (i.e. 1-100nm) is the preferred titanium oxide particle size that is ideal in both the amount of light allowed through and the activity (column 4, line 64 through column 5, line 6). There would have been ample motivation for an ordinary skilled artisan presented with the invention of Wang to look to the teachings of Yamada to achieve maximal catalytic activity. As for the application in Yamada (i.e. a film) such is moot point because it is the highly catalytic titanium dioxide variation which is being incorporated into the method of Wang to replace the generic, less catalytic, photocatalyst. Further in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Art Unit: 1791

The applicant cites the need for high temperature baking with different particle sizes.

Firstly, it is noted that the features upon which applicant relies (i.e., lower needed baking temperature) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Secondly, in response to applicant's argument that the particle size affects the necessary baking temperature, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Given the nature of the prior art there would have been ample motivation to make the combination in order to increase the catalytic activity of the generic titanium dioxide of Wang.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL N. ORLANDO whose telephone number is (571)270-5038. The examiner can normally be reached on Monday-Thursday, 7:30am-4:30pm, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Philip C. Tucker can be reached on (571) 272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1791

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MO

/Philip C Tucker/  
Supervisory Patent Examiner, Art Unit 1791